

We Claim:

1. A pixel-differentiated CCD imager architecture comprising:
a plurality of photo-sensing pixels arranged in a matrix, each pixel being classified according to type from among a plurality of photo-sensing pixel types;
and
read circuitry controllable to respectively read one or more of a second type of pixel independently of reading a first type of pixel, the reading of one or more first type pixels representing a sampling of fewer than all of the plurality of pixels, the sampling being obtainable without having to read all of the plurality of pixels.
2. The CCD imager architecture of claim 1, wherein operation of the read circuitry includes bucket brigading of charge.
3. The CCD imager architecture of claim 1, wherein:
there are fewer second type pixels than first type pixels.
4. The CCD imager architecture of claim 3, wherein:
the second type pixels are arranged amongst the first type pixels such that the second type pixels are uniformly distributed amongst the first type pixels.

5. The CCD imager architecture of claim 1, wherein:
 - a total area covered by the plurality of pixels is organized into a central portion and peripheral portion;
 - the second type pixels are arranged amongst the first type pixels such that a density of second type pixels in the central portion is higher than in the peripheral portion.
6. The CCD imager architecture of claim 5, wherein a distribution of the second type pixels amongst the first type pixels is, for each of the respective central and peripheral portions, one of
 - a uniform distribution or
 - a gradient of density of second type pixels decreasing radially from a center of the total area covered by the plurality.
7. The CCD imager architecture of claim 1, wherein:
 - the first type pixels are organized into blocks; and
 - the read circuitry is further controllable to read selected ones of blocks.
8. The CCD imager architecture of claim 7, wherein the reading of the selected blocks of first type pixels represents a sampling of fewer than all of blocks without having to read all of the blocks.
9. The CCD imager architecture of claim 1, wherein:
 - the plurality is a first plurality;

rows of the matrix are grouped into a second plurality of banks, each bank being organized into a third plurality of arrays of the pixels;

the pixel arrays are arranged to transfer information along a first direction; and

the CCD imager architecture further comprises
a fourth plurality of information-transfer linear arrays of information-transferring cells, each information-transfer array being associated with at least one bank and arranged adjacent to a side of the at least one bank such that two neighboring banks are separated by an information-transferring linear-array.

10. The CCD imager of claim 9, wherein:

each pixel array includes pixels of a first type;

a predetermined number of the pixel arrays are sampling arrays that further include a second type of pixel;

each sampling array is arranged so that sample-information from the second type pixel can be transferred to the associated information-transfer array without the sample-information having to be conveyed via any of the first type pixels in the sampling array;

the sampling array being controllable to read the second type pixel without having to read all of the first type pixels in the sampling array.

11. The CCD imager of claim 10, wherein each pixel array is configured as a linear array of pixels that is controllable to transfer information in a second direction perpendicular to the first direction.

12. The CCD imager of claim 11, wherein each linear array is arranged into a space-filling configuration that covers an area that would otherwise correspond to a two-dimensional array.

13. The CCD imager of claim 12, wherein the space-filling configuration is one of a raster and a piece-wise continuous spiral.

14. A method of operating a CCD imager, the imager having a pixel-differentiated architecture that includes a plurality of photo-sensing pixels arranged in a matrix, each pixel being classified according to type from among a plurality of photo-sensing pixel-types including a first type and a second type of photo-sensing pixel, the method comprising:

reading one or more of the second type pixels independently of reading the first type pixels, the reading of one or more second type pixels representing a sampling of fewer than all of the plurality of pixels, the sampling being obtainable without having to read all of the plurality of pixels.

15. The method of claim 14, further comprising bucket-brigading of charge.

16. The method of claim 14, further comprising:

organizing the first type pixels into blocks; and

selectively transferring information from selected ones of the blocks.

17. The method of claim 16, further comprising:
selectively transferring fewer than all blocks without having to transfer information from all of the blocks.
18. The method of claim 14, wherein:
the plurality is a first plurality;
rows of the matrix are grouped into a second plurality of banks, each bank being organized into a third plurality of arrays of the pixels; and
the pixel-differentiated architecture further includes
a fourth plurality of information-transfer linear arrays of information-transferring cells, each information-transfer array being associated with at least one bank and arranged adjacent to a side of the at least one bank such that two neighboring banks are separated by an information-transferring linear-array,
each pixel array includes first type pixels, and
a predetermined number of the pixel arrays are sampling arrays that further include a second type pixel; and
the method further comprises
transferring sample-information from the second type pixel to the associated information-transfer array without having to convey the sample-information via any of the first type pixels in the sampling array.
19. The method of claim 18, further comprising:
reading the second type pixel of a sampling array without having to read all of the first type pixels in the sampling array.

20. A pixel-differentiated CCD architecture comprising:

a first plurality of non-sampling arrays that include a first type of photosensor; and

a second plurality of sampling arrays that include the first type of photosensor and a second type of photosensor,

each sampling array being arranged so that sample-information from the second type photosensor can be transferred out of the sampling array without the sample-information having to be conveyed via any of the first type photosensors in the sampling array; and

transfer means for transferring information out of one or more selected second type photosensors without also having to transfer information contained in first type photosensors.

21. A pixel-differentiated imager architecture comprising:

a first plurality of blocks, each block having a second plurality of photo-sensing pixels arranged in a matrix, each pixel being classified according to type from among a plurality of types including a first type and a second type of photo-sensing pixel; and

read circuitry controllable to respectively read one or more of the second type pixels independently of reading the first type pixels,

the read-circuitry not being controllable to read all of the pixels individually.

22. The pixel-differentiated imager architecture of claim 21, wherein the imager is implemented as a CCD.

23. The pixel-differentiated imager architecture of claim 21, wherein the read circuitry is controllable to read respectively read one or more of the blocks without having to read all of the blocks,

the read-circuitry not being controllable to read all of the first type pixels in a block individually.

24. A digital camera comprising:

a pixel-differentiated CCD imager architecture including
a plurality of photo-sensing pixels arranged in a matrix, each pixel being classified according to type from among a plurality of photo-sensing pixel-types including a first type and a second type of photo-sensing pixel, and
read circuitry controllable to respectively read one or more of the second type pixels independently of reading the first type pixels, the reading of one or more second type pixels representing a sampling of fewer than all of the plurality of pixels, the sampling being obtainable without having to read all of the plurality of pixels; and

image processing means for controlling the read circuitry and processing the output of the pixel-differentiated CCD imager into a digital representation of an image captured by the pixel-differentiated CCD imager.

25. A digital camera comprising:

a pixel-differentiated CCD imager including

a first plurality of blocks, each block having a second plurality of photo-sensing pixels arranged in a matrix, each pixel being classified according to type from among a plurality of photo-sensing pixel-types including a first type and a second type of photo-sensing pixel; and

read circuitry controllable to respectively read one or more of the second type pixels independently of reading the first type pixels, the read-circuitry not being controllable to read all of the pixels individually; and

image processing means for controlling the read circuitry and processing the output of the pixel-differentiated CCD imager into a digital representation of an image captured by the pixel-differentiated CCD imager.